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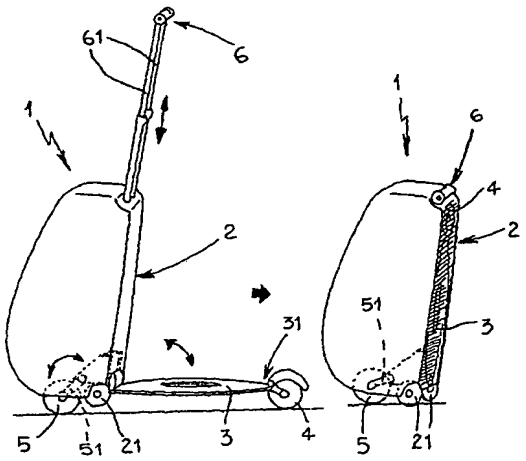

(57) Abstract: A container (1) which can be transported manually on rolling elements has at least one rigid portion (2) comprising at least two rolling elements (21) for moving the container (1) with rolling friction on the ground. The container (1) comprises a footboard (3) which is operatively connected to the rigid portion (2) and is fitted with an auxiliary rolling element (4). The footboard (3) is mobile from a stable closed configuration, in which it is close to the container (1) to minimise its dimensions, to a stable open configuration, in which the footboard (3) is at an angle to the container (1), with the auxiliary rolling element (4) on its free end (31) resting on the ground. The container (1) comprises at least one steerable rolling element (5), operatively connected to grip means (6) connected to the rigid portion (2), so as to allow a user (7) to get onto the footboard (3) between the rigid portion (2) and the auxiliary rolling element (4) and to ride the container (1) like a scooter, using the grip means (6) and supported by the steerable rolling element (5) and the auxiliary rolling element (4).

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Description

SUITCASE WITH INTEGRATED SCOOTER

Technical Field

The present invention relates to container which can be transported manually on rolling elements.

Background Art

Containers which can be transported manually on rolling elements are normally used for easily and effortlessly transporting objects from one place to another.

They may be containers for equipment or tools, or containers for foodstuffs or other items, such as baskets or bags or similar.

More specifically, they may be travel containers, such as suitcases, holdalls, rucksacks, bags. They may be holdalls, bags or rucksacks used by students to carry school items such as textbooks, exercise books, stationery and similar items.

As containers which can be transported manually on rolling elements, the use is known of suitcases or completely rigid containers, or those with at least one rigid portion, equipped with at least two wheels to allow easy pulling or pushing on the ground on which the wheels rest. Such suitcases can be pulled or pushed using the lifting handles, or using an additional handle, which may be telescopically removable from the rigid portion.

The above-mentioned containers which can be transported manually on wheels have several disadvantages.

In particular, it is not always easy and convenient to pull them for long stretches (as may happen in modern airports or stations, or when travelling on foot between two distant places).

Disclosure of the Invention

The aim of the present invention is to overcome the above-mentioned disadvantages, by providing a container which can be transported manually on rolling elements, which allows a user to climb onto it and ride it like a scooter.

Another aim of the present invention is to provide a container which can be transported manually on rolling elements and which can be easily and stably controlled.

Another aim of the present invention is to provide a container which can be transported manually on rolling elements which has the above-mentioned additional functions without excessively increasing its overall dimensions.

These aims and others, which are more apparent in the description which follows, are fulfilled in accordance with the present invention by a container which can be transported manually on rolling elements as described in the claims herein.

Brief Description of the Drawings

The invention is described in more detail below with reference to the accompanying drawings, which illustrate a preferred embodiment, without limiting the scope of its application, and in which:

Figures 1, 2 and 3 are schematic illustrations of a container made in accordance with the present invention respectively in an operating situation, in an operating situation with indication of the movements for reducing its size, in a reduced size situation;

Figures 4, 5, 6, 7 are schematic illustrations of a container made in accordance with the present invention respectively in an operating situation, in an operating situation with indication of the movements for reducing its size, in a reduced size situation;

Figure 8 is a schematic illustration of an alternative embodiment of the container shown in Figures 4, 5, 6, 7;

Figure 9 is a schematic illustration of a container made in accordance with the present invention, the left-hand side showing an operating situation with indications of the movements for reducing its size and the right-hand side showing a reduced size situation, indicating a movement of a steerable rolling element (which, in this case, is a wheel) during the passage between the two situations;

Figure 10 is a perspective schematic view of the container shown in Figure 9 in the reduced size situation;

Figures 11 and 12 are schematic illustrations, for the container shown in Figures 9 and 10, of the connection between the movements of the footboard and the steerable rolling element (which,

in this case, is a wheel) during the passage from the operating situation to a partial reduced size situation;

Figure 13 is a schematic view of an alternative embodiment of the container shown in Figure 9, the left-hand side showing an operating situation with indication of the movements for reducing its size and the right-hand side showing a reduced size situation with the container resting on the ground;

Figure 14 is a schematic front view, the left-hand side showing an operating situation with the container in motion and the right-hand side showing a detail of the container in the reduced size situation;

Figure 15 is a schematic front view of two different operating situations, in motion, for an alternative embodiment of the container in accordance with the present invention;

Figures 16, 17, 18 are respectively a side view, a cross-section along line B - B in Figure 16 and a cross-section along line A - A in Figure 16, of a detail of a joint connecting the footboard to the container and its connection to a steerable rolling element, together with an embodiment of a device for locking the movement of the footboard;

Figures 19 and 20 are two alternative embodiments of the connection between the joint connecting the footboard to the container and the steerable rolling element, together with the locking device shown in Figures 16, 17, 18;

Figures 21, 22, 23 are side views respectively of a footboard stable open configuration, an intermediate configuration and a stable closed configuration, and the relative configurations for the steerable rolling element and for the locking device shown in Figures 16, 17, 18;

Figures 24 and 25 illustrate an alternative embodiment of the footboard locking device in similar situations to those shown in Figures 19 and 20.

Figures 26, 27, 28 are side views of a footboard locking device, similar to that shown in Figures 24 and 25, respectively in a condition in which it locks the footboard in the stable open configuration, a condition in which it releases the footboard from the stable open position, and in an intermediate configuration,

together with the relative configurations of the steerable rolling element;

Figure 29 illustrates a method for activating the footboard locking device shown in Figures 24 to 28, together with three possible positions for the footboard and the auxiliary rolling element;

Figures 30, 31, 32 illustrate, for a particular embodiment of the invention, several movements by the auxiliary rolling element and the footboard if it is a folding footboard;

Figures 33, 34 are top views of a detail of an embodiment of the connection between the auxiliary rolling element and the footboard; the plane in which the wheel constituting the auxiliary rolling element lies is, respectively, perpendicular to and parallel with the footboard;

Figures 35, 36 are top views of a detail of a second embodiment of the connection between the auxiliary rolling element and the footboard; the plane in which the wheel constituting the auxiliary rolling element lies is, respectively, perpendicular to and parallel with the footboard;

Figure 37 is a cross-section in an axial plane of the footboard in the detail shown in Figure 33;

Figures 38 and 39 illustrate two further embodiments of a container in accordance with the present invention;

Figures 40 and 41 illustrate a particular embodiment of the container in accordance with the present invention with removable parts;

Figure 42 illustrates a particular embodiment of grip means for the container in accordance with the present invention;

Figure 43 illustrates a further embodiment of the container in accordance with the present invention;

Figure 44 illustrates a particular method of using the container shown in Figure 43.

Figure 45 illustrates a possible embodiment of a rolling element for the present invention.

Detailed Description of the Preferred Embodiments of the Invention

With reference in particular to Figures 1 to 13 and Figures 38 to 41, as well as 43 and 44, the numeral 1 denotes a container which

can be transported manually on rolling elements. The container 1 which can be transported manually on rolling elements has at least one rigid portion 2 comprising at least two rolling elements 21 for moving the container 1 with rolling friction on the ground.

Moreover, the container 1 characteristically comprises a footboard 3 operatively connected to the rigid portion 2 and fitted with at least one auxiliary rolling element 4. The footboard 3 is mobile from a stable closed configuration (illustrated, for example, in Figures 3, 6 - 8, right-hand side of 9, 10, 12, right-hand side of 13, 32, right-hand side of 38, 40, 43), in which it is close to the container 1 so as to minimise its dimensions, to a stable open configuration (illustrated, for example, in Figures 1, 2, 4, 5, left-hand side of 9, 11, left-hand side of 13, 30, left-hand side of 38, 39), in which the footboard 3, at an angle to the container 1, rests on the ground at its free end 31 by means of the auxiliary rolling element 4. The container 1 also comprises at least one steerable rolling element 5, operatively connected to grip means 6 connected to the rigid portion 2. In this way, when the footboard 3 is in the stable open configuration, as illustrated in Figure 4, a user 7 can climb onto the footboard 3 between the rigid portion 2 and the auxiliary rolling element 4 and steer the container 1 like a scooter, adjusting the grip means 6 and supported by the steerable rolling element 5 and the auxiliary rolling element 4. When, in contrast, the footboard 3 is in the stable closed position, the container 1 again becomes a normal container 1 which can be transported manually, either normally or on rolling elements, like a suitcase, a bag, a rucksack or similar item, for example using grip means 6 (or other additional grip means) to pull the container or transport it.

As shown in Figures 1 to 44, all or some of the rolling elements 4, 5, 21 may consist of wheels, or equivalent means that have a principal rolling axis (such as cylindrical rollers, for example, or balls constrained by a diametrical pin to roll about a principal axis). Alternatively, all or some of the rolling elements may consist of free rolling elements, without a principal rolling axis, an example of a rolling element of this type being shown in Figure 45. In this case, the rolling element is a ball positioned in a suitable housing in such a way that it can roll freely about its

centre in any direction. The housing may also contain conventional rolling bearings (not illustrated) to facilitate the rolling of the ball.

In those cases where the possibility of controlling the direction of the container in the stable open configuration depends on the orientation of the steerable rolling element (or elements) 5, it is generally preferable to use, at least as the steerable rolling element, rolling elements (for example, those illustrated in Figures 4 and 9) that are constrained to roll about a principal axis.

Advantageously (as shown in Figures 2 and 3, 5 and 6, 10, 40 and 41) the footboard 3 can be stored next to the container 1 in a suitable seat 22 in the rigid portion, so as to further reduce the dimensions.

Advantageously, as illustrated in the accompanying drawings, the grip means 6 may be telescopic, at least partially retracting into the rigid portion 2. In general, as illustrated in the accompanying drawings, the grip means 6 can also comprise a handlebar which facilitates the grip on and steering of the container 1 when the footboard 3 is in the stable open configuration.

In one embodiment of the present invention, the grip may be created, as illustrated on the left-hand side of Figure 42, with the grip means 6 comprising at least one element 62 which has an inverted "U" shape, with two rods 61 inserted in the rigid structure 2. Advantageously, as illustrated again in Figure 42 (in particular the right-hand side), the inverted "U" shaped element 62 can also be divided into two parts 63a, 63b at the tip of the inverted "U". At least the upper part of the rods 61 can rotate about their own axis to move the two parts 63a, 63b away from one another so as to form a handlebar, there being means which lock the two parts 63a, 63b relative to one another in the distanced position.

To facilitate steering of the container 1 when the footboard 3 is in the stable open configuration, advantageously, at least in the stable open configuration, the grip means 6 and the steerable rolling element 5 are free to rotate concordantly and simultaneously about at least one axis 8 which is substantially perpendicular to the footboard 3. In this way, the container 1 can be steered.

The grip means 6 and the steerable rolling element 5 may rotate concordantly and simultaneously either about a single axis 8 or about different parallel axes 8 (the latter solution being particularly advantageous in the embodiment described below where there are two steerable rolling elements 5).

The grip means 6 may be the only ones to rotate relative to the footboard 3, or, advantageously, to simplify the mechanisms required for steering (which, in this case, can be reduced to the presence of a single bearing or a pack of bearings), the rigid portion 2 is integral with the grips means 6 in the rotation about the axis 8 which is substantially perpendicular to the footboard 3.

In one embodiment of the present invention, illustrated in Figures 1, 2 and 3, the two rolling elements 21 on the rigid portion 2 are both steerable rolling elements 5. In the embodiment illustrated, since the grip means 6 have two rods 61 inserted in the rigid portion 2, advantageously the rigid portion 2 and grip means 6 are integral in their rotation about the axis 8 which is substantially perpendicular to the footboard 3. If the grip means 6 only had a single rod 61 positioned centrally relative to the rigid portion 2, only the grip means 6 could rotate.

The footboard 3 is suitably located in the stable open configuration, between the two rolling elements 21, which are also steerable rolling elements 5, to allow stable steering conditions for the container 1. Moreover, as illustrated in Figure 3, in the stable closed configuration the footboard 3 may be positioned axially relative to the line joining the centres of the two rolling elements 21. This position may correspond, for example, to alignment of the footboard 3 with the back or a side of the container 1.

In another embodiment of the present invention, illustrated in Figures 4 to 8, the steerable rolling element 5 is located at a first corner 9 of an ideal rectangle 10 with preset height and base on the line joining the two rolling elements 21 on the rigid portion 2 (the ideal rectangle 10 may be, for example, identified in the geometric dimensions of the back of a suitcase, of a side of a holdall, or of the rear section of a rucksack). In this embodiment, the steerable rolling element 5 is an element with a principal rolling axis (for example, it may be a wheel as illustrated in the drawings, but it may also be a cylindrical roller or a ball

constrained to roll about one of its diameters), the principal rolling axis being conveniently disposed substantially perpendicular to one of the diagonals of the ideal rectangle 10. In this case, as illustrated in Figures 4 and 5, when the footboard 3 is in the stable open configuration, the container 1 is at an angle to the ground when it is in motion, the diagonal of the ideal rectangle 10 being substantially perpendicular to the ground. This also allows it to take curves, slightly angling the container 1 while it is in motion.

As illustrated in Figure 8, the steerable rolling element 5 may be added to the two rolling elements 21 on the rigid portion 2. In such cases, the diameter of the steerable rolling element will be such that it allows the two rolling elements 21 to be kept off the ground during the movement of the container 1 when it is used like a scooter, and so as not to interfere with the correct operation of the two rolling elements 21 when the container 1 is used as a normal container.

As illustrated in Figures 4 to 7, advantageously, the steerable rolling element 5 may be one of the two rolling elements 21 on the rigid portion 2. Conveniently, in such cases, as is clearly illustrated in Figure 6, the other rolling element 21 on the container 1 may have a principal rolling axis that is substantially perpendicular to the other diagonal of the ideal rectangle 10.

In this embodiment, advantageously, as illustrated in Figures 5 and 6, the grip means 6 are located at a second corner 20 of the ideal rectangle 10, and are connected to the rigid portion 2 by at least one rod 61 substantially located along the diagonal of the ideal rectangle 10. In the embodiment illustrated the grip means 6 are also telescopic.

Advantageously, the grip means 6 are in the shape of a handlebar and can be folded about the rod 61 along the sides of the ideal rectangle 10 converging on the diagonal on which the rod 61 lies in the second corner 20.

Conveniently, in the stable open position the footboard 3 is located at the steerable rolling element 5, to allow stable steering conditions for the container 1. Moreover, as illustrated in Figure 6, in the stable closed configuration the footboard 3 can be positioned along the diagonal of the ideal rectangle 10. This

position may correspond, for example, to alignment of the footboard 3 with the back or a side of the container 1.

In a preferred embodiment of the invention (different variations of which are illustrated in Figures 9 to 15 and in Figures 38 to 41), the steerable rolling element 5 is located in a plane substantially axial to the line joining the centres of the two rolling elements 21 on the rigid portion 2.

In the footboard 3 stable open and container 1 movement configuration, both the steerable rolling element 5 and the two rolling elements 21 on the rigid portion 2 can rest on the ground. In this case, the two rolling elements 21 are also steerable rolling elements and the possibility of steering the container 1 on corners can be guaranteed either by the integral movement of the rigid portion 2 and the grip means 6, or using a suitable steering mechanism, by the concordant rotation of the grip means 6 and all of the steerable rolling elements. In any movement condition, the container 1, therefore, rests on four rolling elements, for example.

In a preferred variation of this embodiment (illustrated on the left-hand side of Figure 14 and, in yet another variation, in Figure 15), the steerable rolling element 5 rests on the ground, whilst the two rolling elements 21 on the rigid portion 2 are normally raised off the ground when the container 1 is moving in a straight line. This reduces the friction on the ground and the two rolling elements 21 support the container 1 when it tends to lean, so that it travels as if on three wheels.

Advantageously, in this case, as illustrated in Figure 15, the two rolling elements 21 on the rigid portion 2 are wheels that have, at least on an external side and coaxially, at least one truncated cone segment 23 for assisting the work of the steerable rolling element 5 on the ground when the container 1 is leaning on one side or taking a corner. The conicity allows jamming to be avoided when the container 1 is travelling on three wheels.

As illustrated in Figure 13, the two rolling elements 21 may be lifted using a steerable rolling element 5 whose centre is fixed relative to the rigid portion 2 and which has a diameter that allows the two rolling elements 21 to be raised when the footboard 3 is in the stable open configuration (observe the left-hand side of Figure 9), as well as the stability of the container 1 upright on the two

rolling elements 21 and the steerable rolling element 5 when the footboard 3 is in the stable closed configuration (observe the right-hand side of Figure 9). Alternatively, the two rolling elements may be lifted as illustrated for example in Figure 9, with a suitable movement of the centre of the steerable rolling element 5 relative to the rigid portion 2.

Suitably, in the stable open configuration, the footboard 3 is between the two rolling elements 21, allowing stable steering conditions for the container 1. Moreover, in the stable closed configuration the footboard 3 may be axial to the line joining the two rolling elements 21. This position may correspond, for example, to alignment of the footboard 3 with the back or a side of the container 1.

In general, whichever is the steerable rolling element 5 and wherever it is positioned, advantageously, in a preferred embodiment of the invention, the steerable rolling element 5 is mobile from a first stable end configuration in which it is retracted and with minimum dimensions, corresponding to the footboard 3 stable closed configuration, and a second stable end configuration in which it rests and works on the ground, corresponding to the footboard 3 stable open configuration. This type of movement is represented, in several specific examples, in Figures 9 to 13 and in Figure 14 (and, in the examples illustrated, it is also the movement which allowed the rolling elements 21 – wheels, for example – on the rigid portion 2 to be raised off the ground).

In the stable retracted end configuration with minimum dimensions, the steerable rolling element 5 can be inserted in a suitable seat in the rigid portion 2, as illustrated, for example, on the right-hand side of Figure 9 and in Figure 32.

In a preferred embodiment of the invention (several variations of which are illustrated in Figures 21 to 23, 26 to 28, 28 and 30 to 32), the footboard 3 movement from the stable closed configuration to the stable open configuration controls the steerable rolling element 5 movement from the first to the second end configuration. A locking device 11, operatively connected to the footboard 3 and to the steerable rolling element 5, simultaneously locks the footboard 3 and the steerable rolling element 5 respectively in the stable closed configuration and in the first end configuration, as well as

in the stable open configuration and in the second end configuration and may be released at least manually, to free the footboard 3 and the steerable rolling element 5.

Suitably, the footboard 3 is joined to the rigid portion 2 so that it at least rotates between the stable closed configuration and the stable open configuration. At least one rocker arm 51 is connected in such a way that it may rotate to the rigid portion 2, supporting the steerable rolling element 5 at its first end 52. It is operatively connected to the footboard 3 at its second end 53 and is guided by the movement of the footboard 3 as if by a cam, controlling the movement of the steerable rolling element 5 between the first and the second end configurations (this, as illustrated in Figures 16, 21 - 23, 26 - 29, may be achieved using a pin - slot coupling between the rocker arm 51 and the footboard 3 or one of its projections, in this case a body 34). The locking device 11, between the footboard 3 and the rigid portion 2, comprises at least one actuator 12 with an operating head 13 that can move alternatively from a first position in which it interferes with the motion of the footboard 3 and the rigid portion 2, to a second position for rapid release of the locking device 11. The first position corresponds to the steerable rolling element 5 first and second end configurations. The second position corresponds to the footboard 3 free movement between the stable open configuration and the stable closed configuration. The locking device 11 also comprises elastic return means 14 for automatic positioning of the operating head 13 in the first position corresponding to the first and second end configurations.

In this way, adjusting the actuator 12, opposing the action of the elastic return means 14 (as illustrated with an arrow in Figure 21 or in Figures 26, 27, 29), the footboard 3 can be removed from the position in which it interferes with the operating head 13 and the footboard 3 can be rotated (as illustrated in Figure 22 or 28) to the stable open configuration. When this has been reached (as shown in Figure 23), the action of the elastic return means 14 leads to stable engagement of the footboard 3 by interference by the operating head 13. Similarly, the footboard 3 can be moved in the opposite direction, from the stable open configuration to the stable closed configuration.

If the steerable rolling element 5 is connected to the rigid portion 2 and to the footboard 3 by the rocker arm 51, the footboard 3 movement is connected to the steerable rolling element 5 movement between the first and second end configurations. In this case, stabilisation of the footboard 3 stable open configuration and the stable closed configuration (by the operating head 13) stabilises the first and second steerable rolling element 5 end configurations.

If there is no connection between the footboard 3 movement between the stable open configuration and the stable closed configuration and the steerable rolling element 5 (as illustrated in Figures 19 and 20 and in the alternative embodiments in Figures 24 and 25), for example due to the absence of the rocker arm 51, the footboard can still be joined to the rigid portion 2 and the above-mentioned locking device 11 can still be used to automatically lock the footboard 3 in the stable open or stable closed configurations, or to release it. In this case, the steerable rolling element 5 may have an independent movement between the first and second end configurations, or may not have any movement apart from that transmitted to it by the operative connection to the grip means 6.

The following is a description of two embodiments of the movement of the joint between the footboard 3 and the rigid portion 2 and of the footboard 3 locking/release in the stable open configuration and in the stable closed configuration which, as already indicated, may be applied identically to movement of the footboard 3 only or to co-ordinate movement of the footboard 3 and the steerable rolling element 5 (as determined, for example, by the presence of the rocker arm 51).

In a first embodiment, as illustrated in Figures 16 to 23, the actuator 12 is supported by the rigid portion 2. A joint 32 for movement of the footboard 3 between the stable closed configuration and the stable open configuration comprises a pin 33 integral with the rigid portion 2 and a body 34 integral with the footboard 3 and rotating about the pin 33. The body 34 has at least two seats 35 set at an angle to one another, for insertion of the actuator 12 operating head 13 and corresponding to the stable closed configuration and to the stable open configuration.

Manual release of the locking device 11 (in the case in question, movement of the actuator 12) is possible using the

corresponding control (such as a lever, connecting rod, hook or small handle), which may be grasped either from the rigid portion 2 or at the grip means 6.

The rotation of the grip means 6 and the rigid portion 2 about the axis 8 perpendicular to the footboard 3 may, for example, be achieved by fitting the joint with a bearing, as illustrated in Figure 18.

In a second embodiment, as illustrated in Figures 24 to 29, the actuator 12 is supported by the footboard 3. The joint 32 for movement of the footboard 3 between the stable closed configuration and the stable open configuration again comprises a pin 33 integral with the rigid portion 2 and a body 34 integral with the footboard 3 and rotating about the pin 33. The two seats 35 set at an angle to one another, for insertion of the actuator 12 operating head 13 (corresponding to the stable closed configuration and to the stable open configuration) are, in this case, made in the pin 33.

Conveniently, the actuator 12 comprises an axial element 15 which slides in a guide substantially parallel with the footboard 3 and is substantially transversal to the operating head 13. The axial element 15 is operatively connected to the operating head 13, and its backward movement to oppose the elastic return means 14, as illustrated in Figures 26 and 27, releases the operating head 13 from the pin 33, consequently releasing the footboard 3. In contrast, the axial element 15 forward motion, driven by the action of the elastic return means 14, engages the operating head 13 in at least one of the two seats 35, consequently locking the footboard 3.

The division of the actuator 12 into the axial element 15 and the operating head 13 means that, when the actuator 12 is supported by the footboard 3, a suitable connection between the two parts of the actuator 12 allows rotation of the footboard 3 with a bearing at the joint 32.

An embodiment of the connection between the axial element 15 and the operating head 13 is illustrated in Figures 24 to 29. The operating head 13 slides in a guide substantially transversal to the footboard, with a lower stroke limited by a stop 17. Elastic opposing means 16 tend to move the operating head 13 away from the pin 33 and towards the stop 17. Between the axial element 15 and the operating head 13 there is a connection with angled planes which

slide over one another, in such a way that a backward movement of the axial element 15 causes, by the action of the elastic opposing means 16, the release of the operating head 13 from the seats 35. When the operating head 13 is in contact with the stop 17, the angled planes are still at least partially covering one another, that is to say, when the axial element 15 is released, the elastic return means 14 (which must be stronger than the elastic opposing means 16) push the axial element 15 forwards, moving the operating head 13 towards the pin 33 and automatically inserting it in one of the seats 35. Advantageously, the connection between the axial element 15 and the operating head 13 can be created using two conical surfaces, allowing rotation of the grip means 6 and the rigid portion 2 about the axis 8 substantially perpendicular to the footboard 3, by means of a single bearing.

The locking device 11 can be manually released (in the case in question, movement of the actuator 12) using one of the corresponding controls (such as a lever, connecting rod, hook or small handle) which may be grasped at the footboard 3. In a preferred embodiment of this type, illustrated in Figure 29, the actuator 12 may be operated by directly adjusting the auxiliary rolling element 4. In particular, the auxiliary rolling element 4 is operatively connected to the actuator 12 (per example, by means of a screw connection on the axial element 15) and may be moved parallel with the direction in which the footboard 3 extends and opposing the action of the elastic return means 14, thus releasing the locking device 11.

Appropriately, to further reduce the size of the container 1 when the footboard 3 is in the stable closed configuration (as illustrated in Figures 9 and 10, 29, 31, 43 and, in particular, in Figures 31 - 36), the auxiliary rolling element 4 is a wheel and the plane in which it lies is mobile at least from a first stable position perpendicular to the footboard 3 to a second stable position parallel with the footboard 3, to reduce its dimensions in the footboard 3 stable closed configuration. In particular, as indicated in Figures 33-37, the auxiliary rolling element 4 can move in a guide in its own plane in a direction parallel with the extension of the footboard 3. There are elastic connecting means 18 between the auxiliary rolling element 4 and the footboard 3

operating in the direction parallel with the extension of the footboard 3 to keep the auxiliary rolling element 4 in contact with the footboard 3. Geometric interference means 19 between the auxiliary rolling element 4 and the footboard 3 stably inhibit, but in a removable fashion, the rotation of the plane in which the auxiliary rolling element 4 lies about the direction parallel with the extension of the footboard 3 when the plane in which the auxiliary rolling element 4 lies is in the first or second stable position. The geometric interference means 19 may be released by keeping the auxiliary rolling element 4 moved in a position opposing the action of the elastic connecting means 18. In this way, as illustrated in Figures 33 and 35 and in Figures 34 and 36, moving the auxiliary rolling element 4 away from the footboard 3 releases the interference means 19 with the possibility of rotating the plane in which the auxiliary rolling element 4 lies. Releasing the auxiliary rolling element 4 after a suitable rotation of the plane in which it lies, the geometric interference means 19 again operate, driven by the elastic connecting means 18, locking the auxiliary rolling element 4. By way of example, Figures 33 to 36 show geometric interference means 19 made using matching saw tooth shapes on the auxiliary rolling element 4 support and on the footboard 3. The shapes cause jamming and lock the rotation driven by the elastic connecting means 18 and are, in particular, symmetrical in Figures 33 and 34 and asymmetrical in Figures 35 and 36.

Similarly, the geometric interference means 19 may be produced, for example, by making suitable shapes on a sliding element 25 (illustrated in Figure 37 and, for example, used as a stop for the elastic connecting means 18) as well as suitable matching shapes on the guide of the sliding element 25 inside the footboard.

As illustrated with the dashed line in Figure 37, and as shown in Figure 29 (where the wheel constituting the auxiliary rolling element 4 is illustrated with a dashed line, lying parallel with the footboard plane when the footboard is in the stable closed configuration), in particular and most advantageously, the possibility of rotating the plane in which the auxiliary rolling element 4 lies can be integrated in the mechanism for manually releasing the locking device 11 in Figure 29, where said device is activated by adjusting the auxiliary rolling element 4. In this

case, the sliding element 25 coincides with the axial element 15 or at least part of the actuator 12, whilst the elastic connecting means 18 coincide with the elastic return means 14.

In yet another embodiment of the present invention, illustrated in particular in Figures 30 to 32, the footboard 3 has at least one first and one second segment 36, 37 which can be folded over one another to reduce the dimensions of the footboard 3 in the stable closed configuration. The first and second segments 36, 37 may be hinged together.

Using suitable methods well known to mechanics, the system used to fold the first and second segments 36, 37 of the footboard 3 over one another may be integrated with the mechanism for releasing the locking device 11 illustrated in Figure 29, with the mechanism for rotating the plane in which the wheel constituting the auxiliary rolling element 4 lies, or with both. Obviously, a system of this kind, and any other suitable system, may also be accomplished in cases where the auxiliary rolling element 4 is not a wheel.

Figure 30, for example (and Figures 31 and 32) illustrates an embodiment of the system integrated with the mechanism for rotation of the plane in which the auxiliary rolling element 4 lies, already described with reference to Figures 33 to 37. Said description should be consulted for an explanation of the elements. In this case, in particular, the geometric interference means 19 may consist of a simple shaped projection 26 (for example, part of the sliding element 25) which can be inserted in a seat 27 with matching shape, designed so that, once inserted, it prevents rotation of the plane in which the auxiliary rolling element 4 lies and of the first and second segments 36 and 37. Thus, the backward movement of the projection 26 simultaneously frees rotation of the plane in which the auxiliary rolling element 4 lies and rotation of the first and second segments 36, 37. Definitive positioning of the footboard 3 in the stable closed configuration and in the stable open configuration, therefore, occurs with a single movement.

Alternatively, the shaped projection 26 may be a single pin, designed to prevent only relative rotation of the first and second segments 36 and 37. In this case, the geometric interference means 19 may be made in the form already described with reference to Figures 33 to 37. Therefore, a backward movement of the projection

26 releases only the relative rotation of the first and second segments 36 and 37. Rotation of the plane in which the auxiliary rolling element 4 lies must be performed separately. Definitive positioning of the footboard 3 in the stable closed configuration or in the stable open configuration in this case occurs in two steps.

Advantageously, as illustrated in Figures 40 and 41, the rigid portion 2 comprises at least one part 24 removable from the container 1. The removal part 24 comprises at least the footboard 3. If the removable part 24 also comprises the grip means 6 and the steerable rolling element 5, it may be used independently as a scooter.

Moreover, as illustrated in Figure 43, the container 1 advantageously has at least one shoulder strap 30. This means that the container 1 can be used as a rucksack.

The rigid portion 2 comprises at least a frame, as illustrated in Figures 38 and 39, for support and for guiding the rods 61 of the grip means 6.

The rigid portion 2, the footboard 3 and all of the components may be made of light materials (such as light alloys and/or plastics) so that the user 7 does not have to carry an excessive additional weight when the container 1 is used in the conventional manner. All of the devices used to reduce the dimensions contribute to obtaining a container 1 with overall dimensions comparable to those of conventional containers of equal capacity. This is particularly important above all when the container 1 is a suitcase of the type which can be used as "hand luggage" on aeroplanes or high speed trains.

The present invention has important advantages.

Firstly, it allows a container to be used as if it were a scooter, allowing easy movement even over lengthy stretches, even if the contents of the container are very heavy. Advantageously, when used as a conventional container, the container has dimensions comparable to those of a conventional container of equal capacity, without an excessive weight increase.

The invention described can be subject to numerous modifications and variations without thereby departing from the scope of the inventive concept.

Moreover, all the details of the invention may be substituted by technically equivalent elements.

Basically, any type of material and dimensions may be used, depending on requirements.

Claims

1. A container (1) which can be transported manually on rolling elements, of the type with at least one rigid portion (2) comprising at least two rolling elements (21) for moving the container (1) with rolling friction on the ground, characterised in that:
- the container (1) comprises a footboard (3) operatively connected to the rigid portion (2) and fitted with at least one auxiliary rolling element (4);
- the footboard (3) is mobile from a stable closed configuration, in which it is close to the container (1) to minimise the dimensions, to a stable open configuration, in which the footboard (3), being at an angle to the container (1), rests on the ground at its free end (31) by means of the auxiliary rolling element (4);
- the container (1) comprises at least one steerable rolling element (5), operatively connected to grip means (6) connected to the rigid portion (2);
allowing a user (7) to climb onto the footboard (3) between the rigid portion (2) and the auxiliary rolling element (4) and to steer the container (1) like a scooter, adjusting the grip means (6) and supported by the steerable rolling element (5) and the auxiliary rolling element (4).

2. The container (1) according to claim 1, characterised in that, at least in the stable open configuration, the grip means (6) and the steerable rolling element (5) are free to rotate concordantly and simultaneously about at least one axis (8), the latter being substantially perpendicular to the footboard (3).

3. The container (1) according to claim 2, characterised in that the rigid portion (2) is integral with the grip means (6) in the rotation about the axis (8) substantially perpendicular to the footboard (3).

4. The container (1) according to claim 1 or 2 or 3, characterised in that the steerable rolling element (5) is located in a plane substantially axial to the line joining the centres of the two rolling elements (21) on the rigid portion (2).

5. The container (1) according to claim 4, characterised in that, when the steerable rolling element (5) rests on the ground, the two

rolling elements (21) on the rigid portion (2) are normally raised off the ground when the container (1) is moving in a straight line.

6. The container (1) according to claim 5, characterised in that the two rolling elements (21) on the rigid portion (2) are wheels that have, at least on an external and coaxial side, at least one truncated cone segment (23) for assisting the work of the steerable rolling element (5) on the ground when the container (1) is angled on one side or taking a curve.

7. The container (1) according to any of the claims from 1 to 6, characterised in that the two rolling elements (21) on the rigid portion (2) are steerable rolling elements (5).

8. The container (1) according to claim 1 or 2 or 3, characterised in that the steerable rolling element (5) is located at a first corner (9) of an ideal rectangle (10) with preset height and base on the line joining the two rolling elements (21) on the rigid portion (2), and has a principal axis of rotation that is substantially perpendicular to one of the diagonals of the ideal rectangle (10).

9. The container (1) according claim 8, characterised in that the steerable rolling element (5) coincides with one of the two rolling elements (21) on the rigid portion (2).

10. The container (1) according to any of the foregoing claims, characterised in that the steerable rolling element (5) is mobile from a first stable end configuration in which it is retracted and with minimum dimensions, corresponding to the footboard (3) stable closed configuration, to a second stable end configuration in which it rests and works on the ground, corresponding to the footboard (3) stable open configuration.

11. The container (1) according to claim 10, characterised in that:

- the footboard (3) movement from the stable closed configuration to the stable open configuration controls the movement of the steerable rolling element (5) from the first to the second end configuration;
- a locking device (11), operatively connected to the footboard (3) and to the steerable rolling element (5), simultaneously locks the footboard (3) and the steerable rolling element (5) respectively in the stable closed configuration and in the first end configuration, as well as in the stable open configuration and in the second end

configuration, there being the possibility of releasing it at least manually, in order to release the footboard (3) and the steerable rolling element (5).

12. The container (1) according to claim 11, characterised in that:

- the footboard (3) is hinged to the rigid portion (2) at least for rotation between the stable closed configuration and the stable open configuration;
- at least one rocker arm (51) is engaged in such a way that it can rotate with the rigid portion (2), a first end (52) of the rocker arm (51) supporting the steerable rolling element (5), and a second end (53) of the rocker arm (51) being operatively connected to the footboard (3) and is guided by the movement of the footboard (3) as if by a cam, controlling the movement of the steerable rolling element (5) between the first and second end configurations;
- the locking device (11), between the footboard (3) and the rigid portion (2), comprises at least one actuator (12) with an operating head (13) which moves alternately from a first position in which it interferes with the motion of the footboard (3) and the rigid portion (2), to a second position in which the locking device (11) is rapidly released, the first position corresponding to the steerable rolling element (5) first and second end configurations, the second position corresponding to the free footboard (3) movement between the stable open configuration and the stable closed configuration, the locking device (11) also comprising elastic return means (14) for automatically positioning the operating head (13) in the first position corresponding to the first and second end configurations.

13. The container (1) according to claim 12, characterised in that:

- the actuator (12) is supported by the rigid portion (2);
- a joint (32) for movement of the footboard (3) between the stable closed configuration and the stable open configuration comprises a pin (33) integral with the rigid portion (2) and a body (34) integral with the footboard (3) and rotating about the pin (33), the body (34) having at least two seats (35) set at an angle to one another, for insertion of the actuator (12) operating head (13) and

corresponding to the stable closed configuration and to the stable open configuration.

14. The container (1) according to claim 12, characterised in that:

- the actuator (12) is supported by footboard (3);
- a joint (32) for movement of the footboard (3) between the stable closed configuration and the stable open configuration comprises a pin (33) integral with the rigid portion (2) and a body (34) integral with the footboard (3) and rotating about the pin (33), the pin (33) having at least two seats (35) set at an angle to one another, for insertion of the actuator (12) operating head (13) and corresponding to the stable closed configuration and to the stable open configuration.

15. The container (1) according to claim 14, characterised in that the actuator (12) comprises an axial element (15) which slides in a guide substantially parallel with the footboard (3) and is substantially transversal to the operating head (13), the axial element (15) being operatively connected to the operating head (13), and the backward movement of the axial element (15) to oppose the elastic return means (14) releasing the operating head (13) from the pin (33), consequently releasing the footboard (3), whilst the axial element (15) forward motion, driven by the action of the elastic return means (14), engages the operating head (13) in at least one of the two seats (35), consequently locking the footboard (3).

16. The container (1) according to claim 14 or 15, characterised in that the actuator (12) can be operated by directly adjusting the auxiliary rolling element (4).

17. The container (1) according to any of the claims from 1 to 9, characterised in that:

- the footboard (3) is hinged to the rigid portion (2) at least for rotation between the stable closed configuration and the stable open configuration;
- a locking device (11), between the footboard (3) and the rigid portion (2), comprises at least one actuator (12) with an operating head (13) which moves alternately from a first position in which it interferes with the motion of the footboard (3) and the rigid portion (2), and a second position in which the locking device (11) is rapidly released and in which the footboard (3) can move freely

between the stable open configuration and the stable closed configuration, the locking device (11) also comprising elastic return means (14) for automatically positioning the operating head (13) in the first position when the first or second end configuration is reached.

18. The container (1) according to any of the foregoing claims, characterised in that the footboard (3) has at least one first and one second segment (36, 37) which can be folded over one another to reduce the dimensions of the footboard (3) in the stable closed configuration.

19. The container (1) according to any of the foregoing claims, characterised in that the auxiliary rolling element (4) is a wheel and in that the plane in which it lies is mobile at least from a first stable position perpendicular to the footboard (3) to a second stable position parallel with the footboard (3), to reduce its dimensions in the footboard (3) stable closed configuration.

20. The container (1) according to claim 19, characterised in that:

- the auxiliary rolling element (4) can move in a guide in its own plane in a direction parallel with the extension of the footboard (3);
- there are elastic connecting means (18) between the auxiliary rolling element (4) and the footboard (3) operating in the direction parallel with the extension of the footboard (3) to keep the auxiliary rolling element (4) in contact with the footboard (3);
- geometric interference means (19) between the auxiliary rolling element (4) and the footboard (3) stably inhibit, but in a removable fashion, the rotation of the plane in which the auxiliary rolling element (4) lies about the direction parallel with the extension of the footboard (3) when the plane in which the auxiliary rolling element (4) lies is in the first or second stable position;

it being possible to release the geometric interference means (19) keeping the auxiliary rolling element (4) moved in a position opposing the action of the elastic connecting means (18).

21. The container (1) according to claim 8 or 9, characterised in that the grip means (6) are located at a second corner (20) of the ideal rectangle (10), being connected to the rigid portion (2) by at

least one rod (61) substantially located along the diagonal of the ideal rectangle (10).

22. The container (1) according to claim 21, characterised in that the grip means (6) are in the shape of a handlebar and can be folded about the rod (61) along the sides of the ideal rectangle (10) converging on the diagonal on which the rod (61) lies in the second corner (20).

23. The container (1) according to any of the foregoing claims, characterised in that the grip means (6) comprise at least one element (62) which has an inverted "U" shape, having two rods (61) inserted in the rigid structure (2).

24. The container (1) according to claim 23, characterised in that the inverted "U" shaped element (62) can be divided into two parts (63a, 63b) at the tip of the inverted "U", at least the upper part of the rods (61) being able to rotate about their axis to move the two parts (63a, 63b) away from one another so as to form a handlebar, there being means which lock the two parts (63a, 63b) relative to one another in the distanced position.

25. The container (1) according to any of the foregoing claims, characterised in that the grip means (6) are telescopic, at least partially retracting into the rigid portion (2).

26. The container (1) according to any of the foregoing claims, characterised in that the rigid portion (2) comprises at least a frame.

27. The container (1) according to any of the foregoing claims, characterised in that the rigid portion (2) comprises at least one part (24) removable from the container (1), the removal part (24) comprising at least the footboard (3).

28. The container (1) according to any of the foregoing claims, characterised in that it comprises at least one shoulder strap (30) for carrying the container (1) on the shoulder.

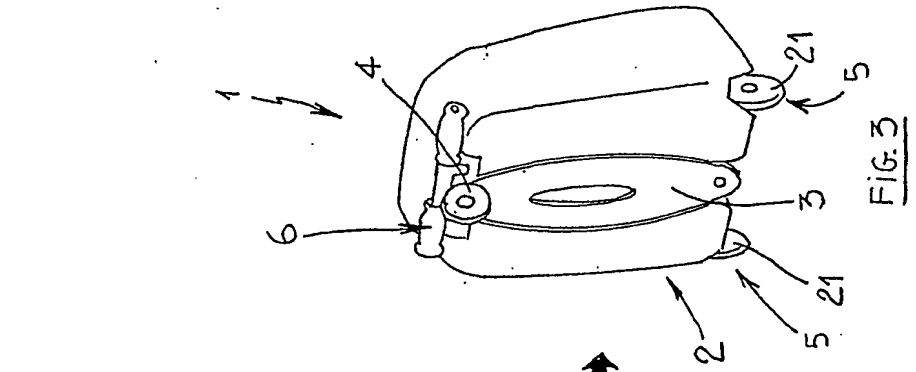


Fig.3

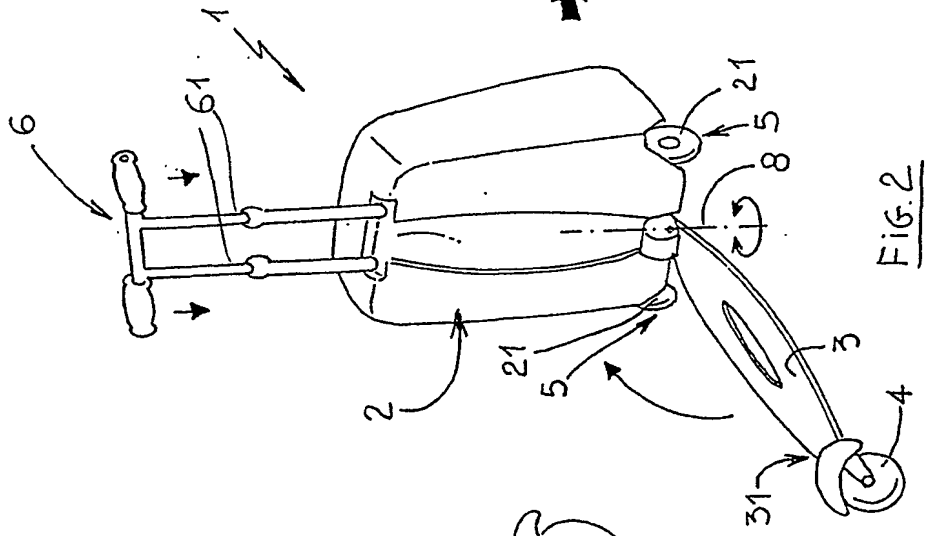


Fig.2

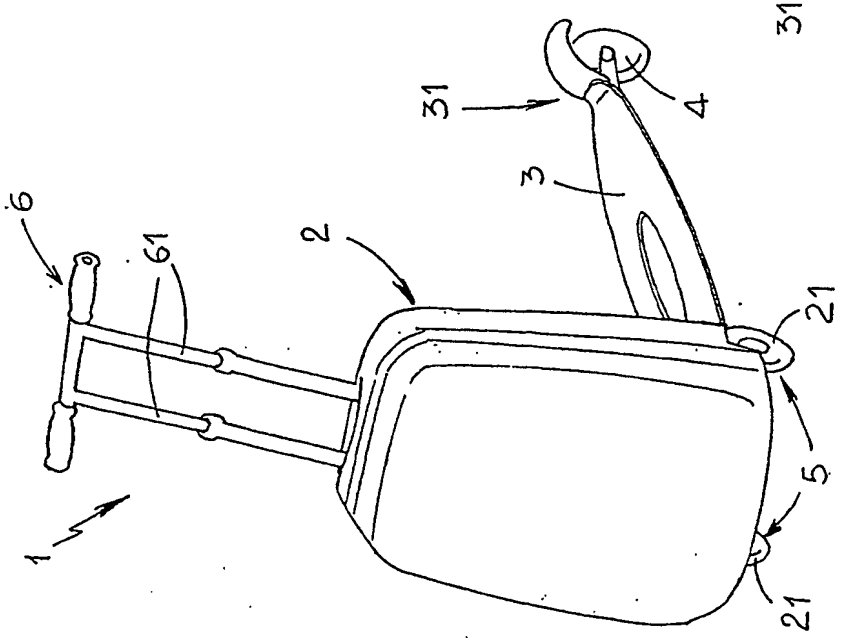


Fig.1

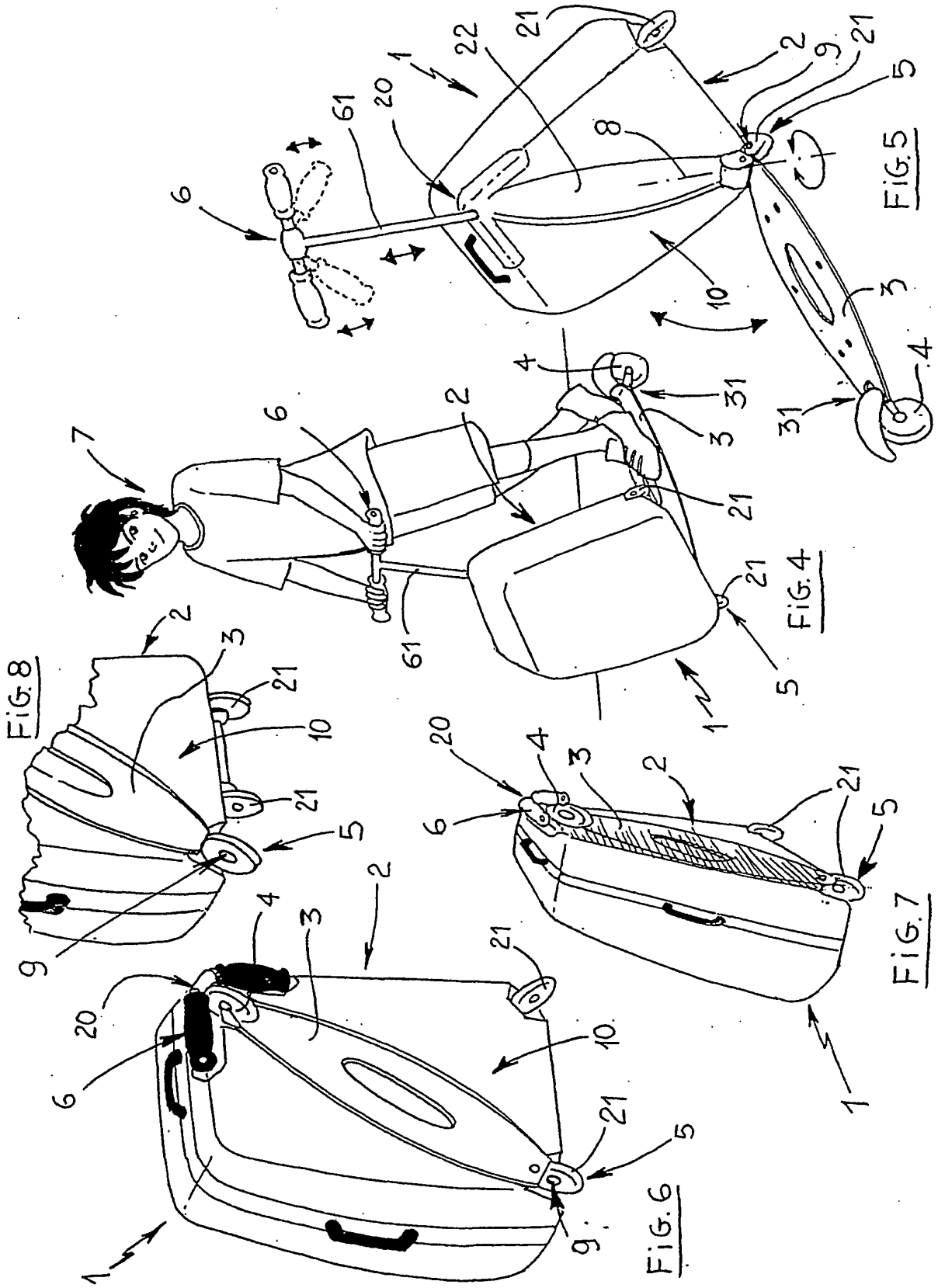


Fig.5

Fig.4

Fig.8

Fig.7

Fig.6

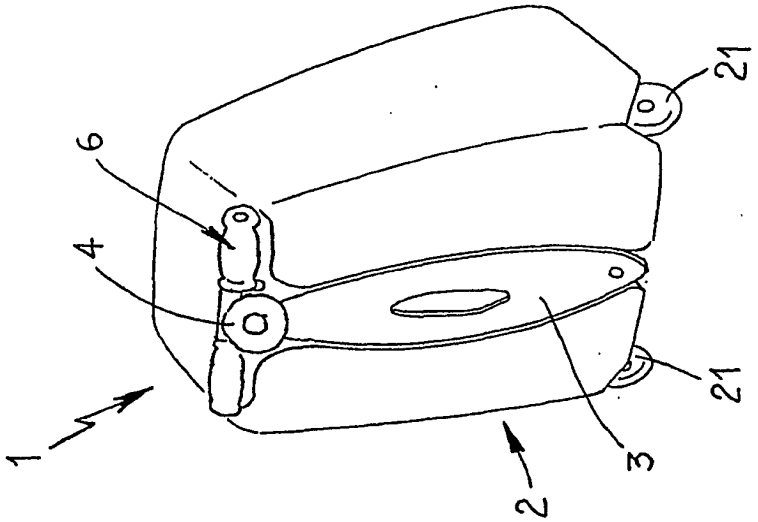
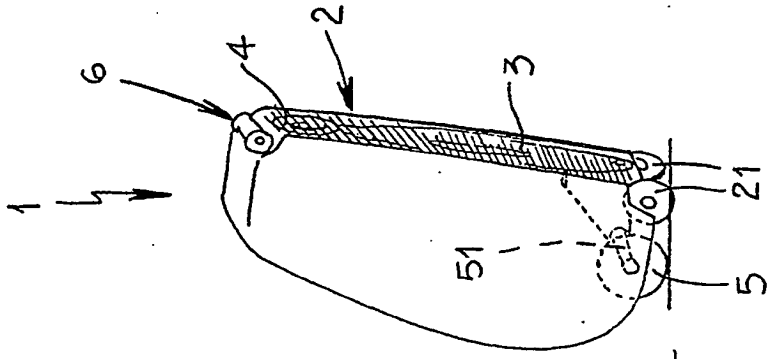


FIG. 10



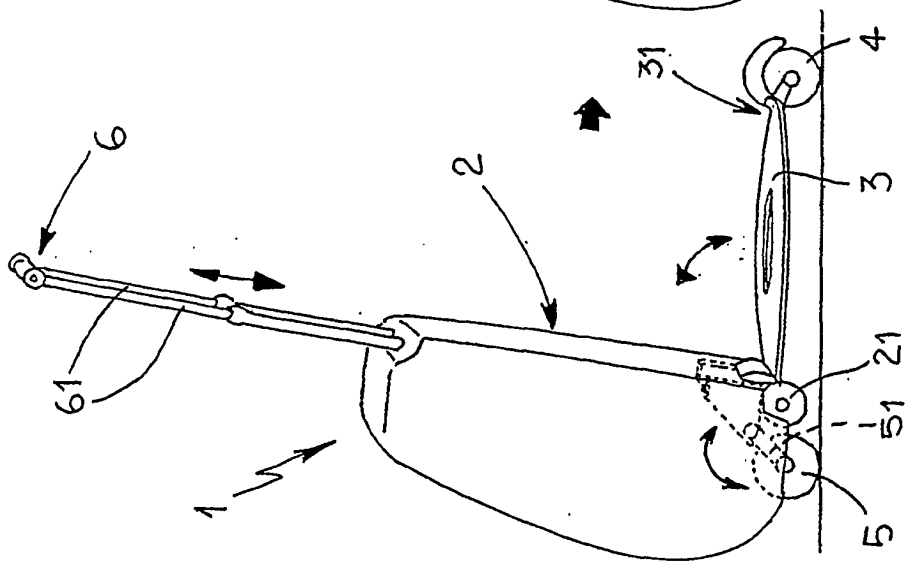


FIG. 9

FIG. 12

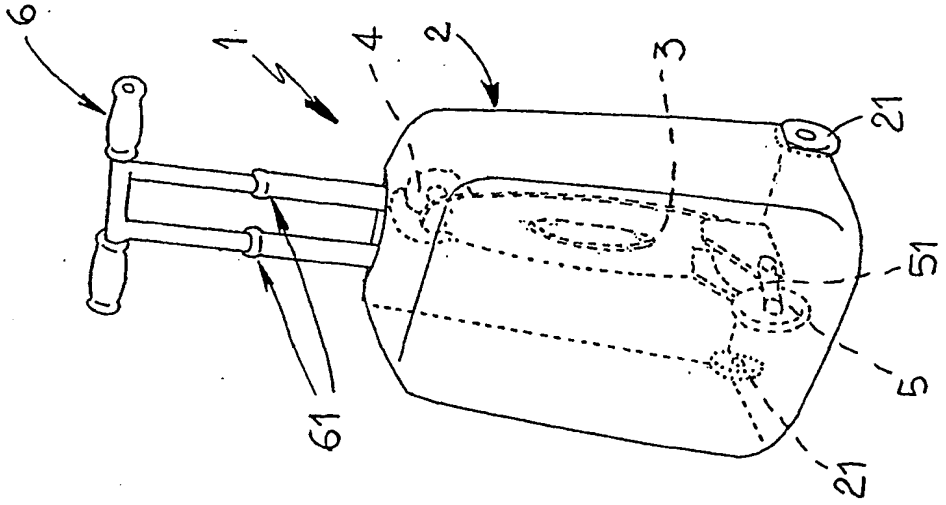
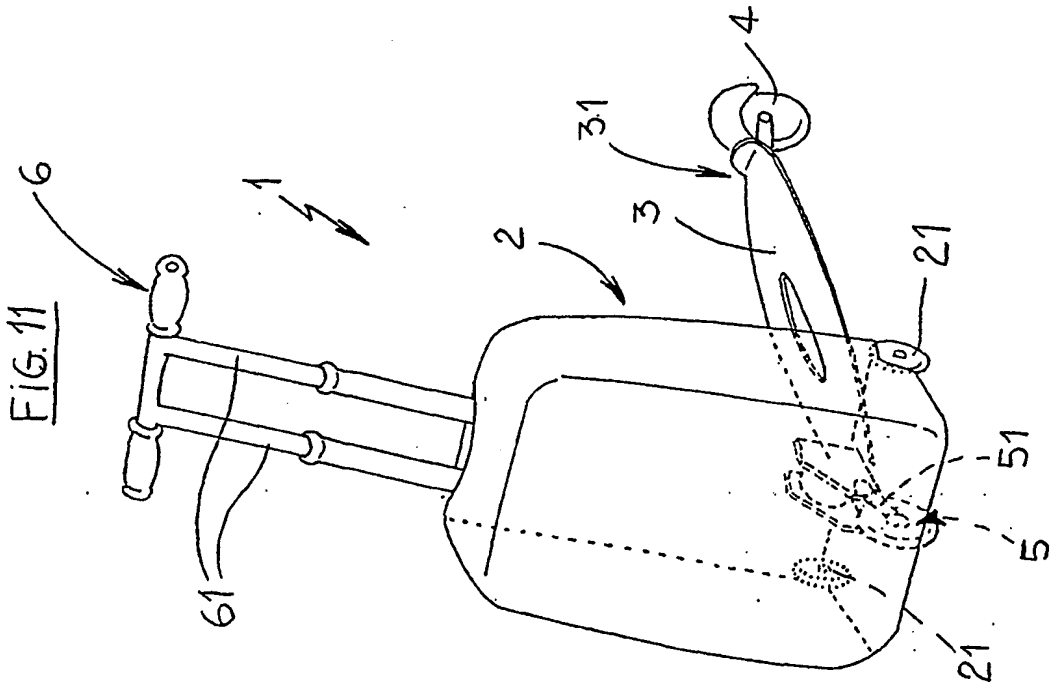


FIG. 11



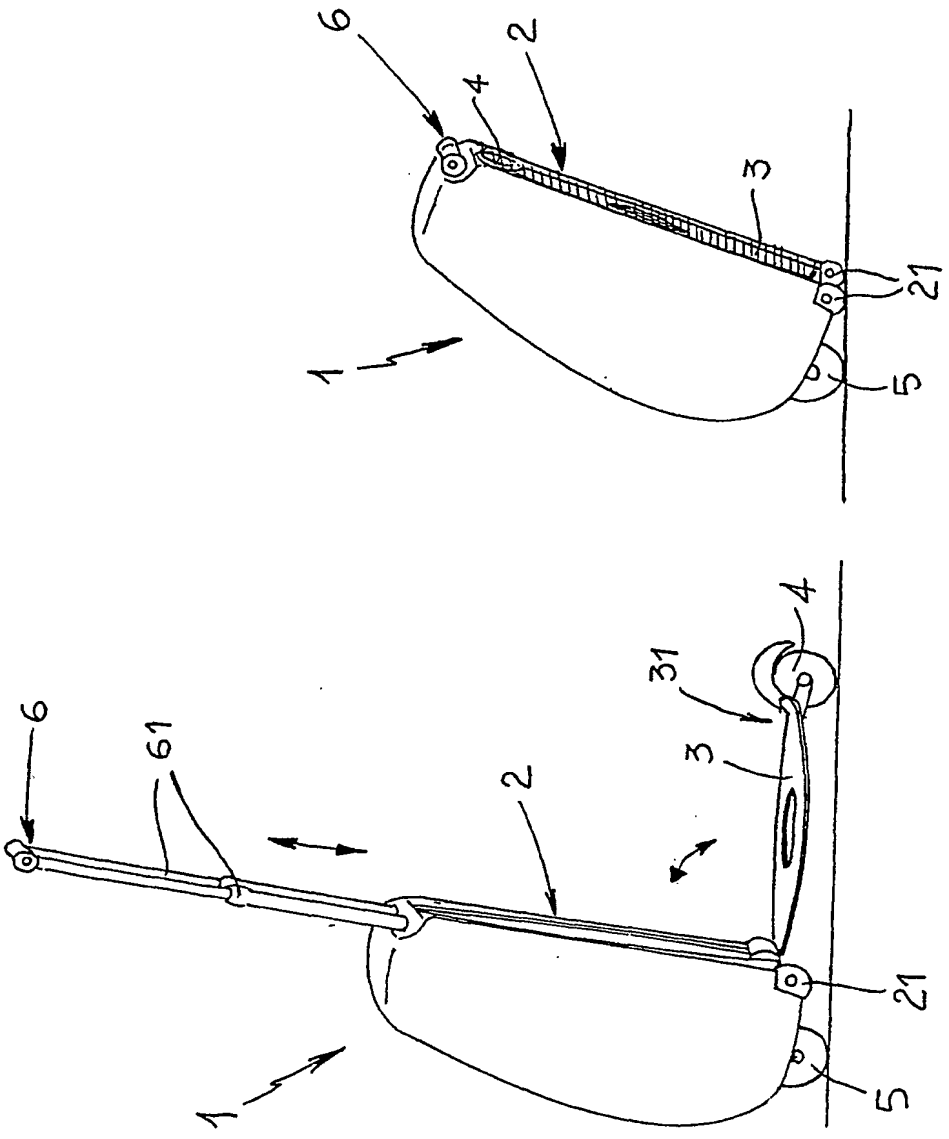


Fig. 13

Fig. 14

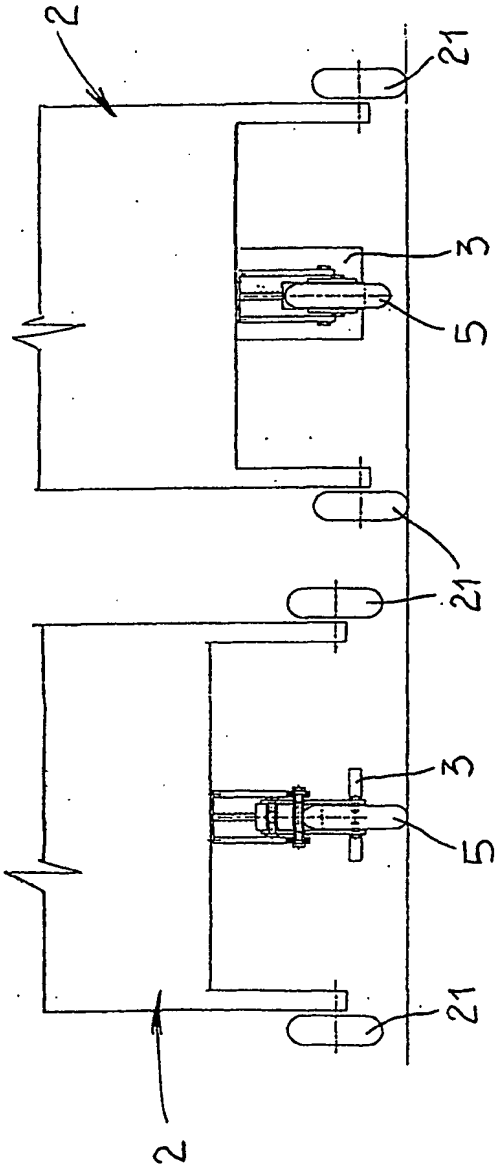
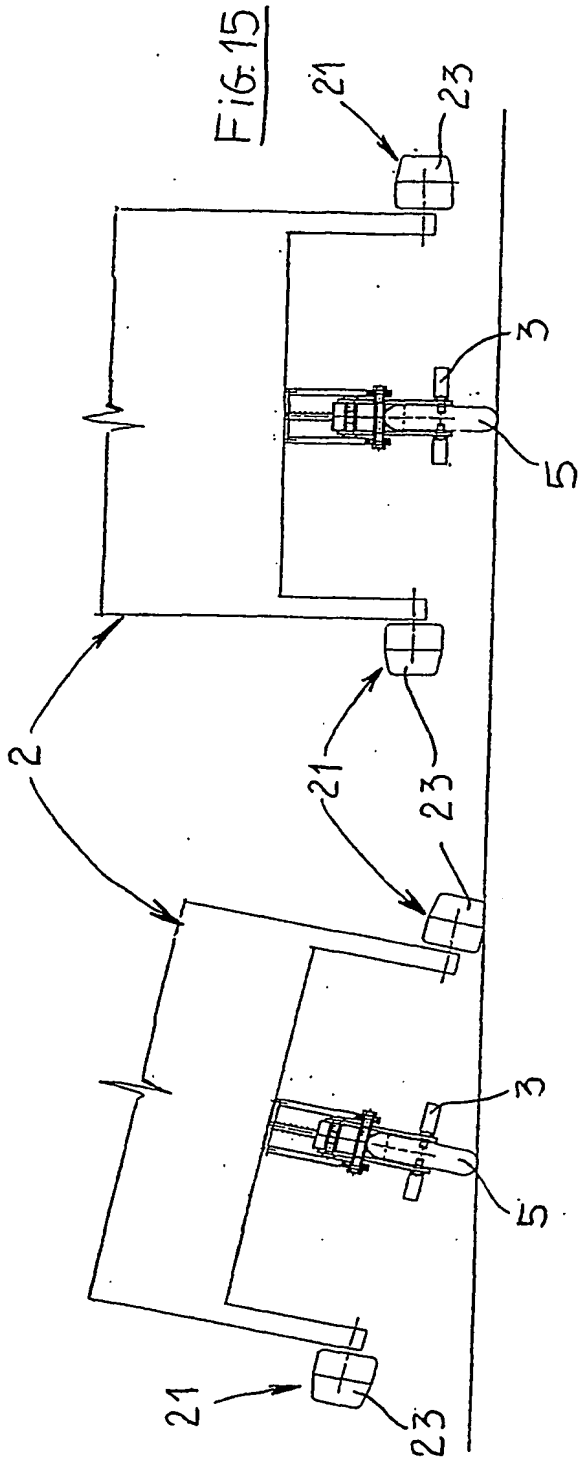


Fig. 15



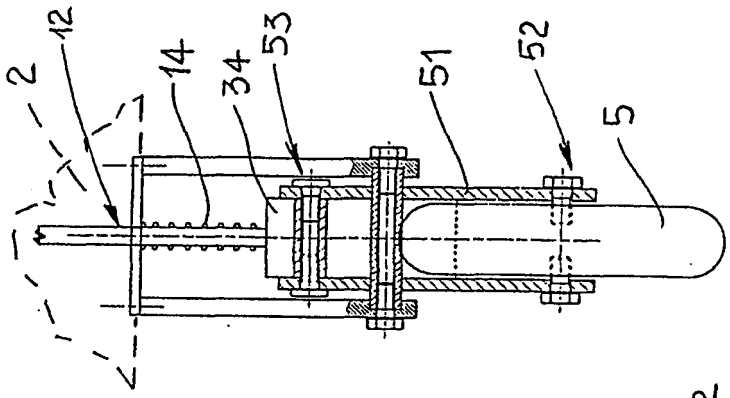


FIG.17

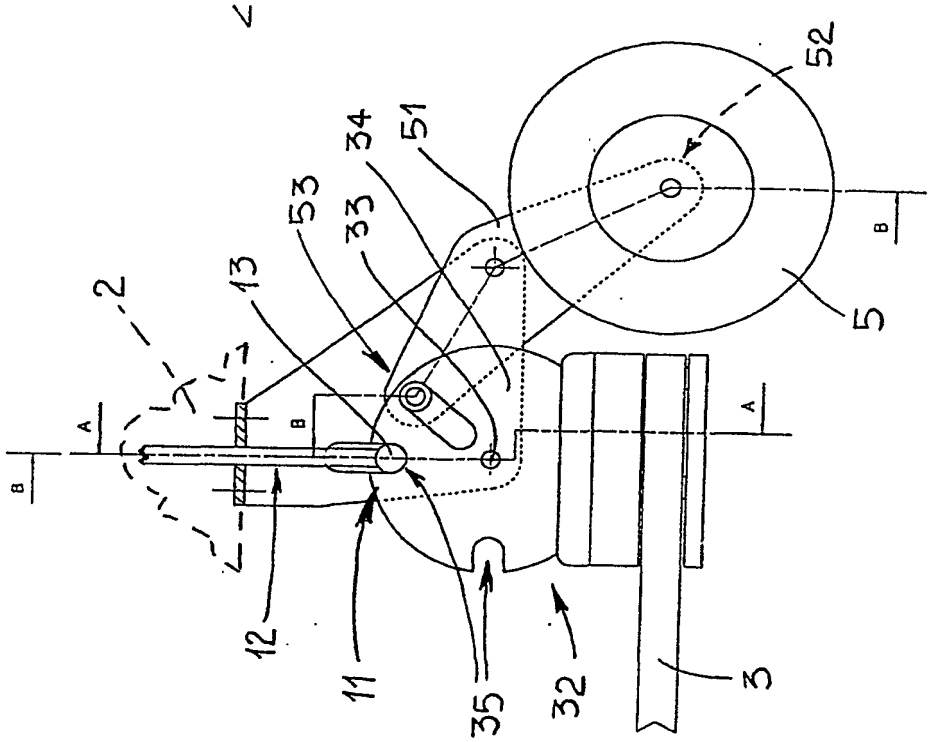


FIG. 16

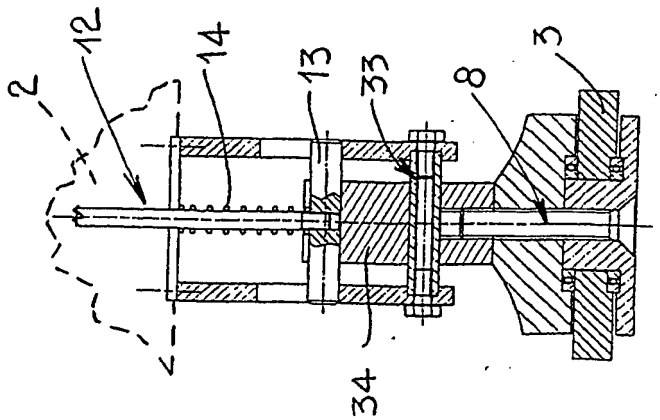


FIG. 18

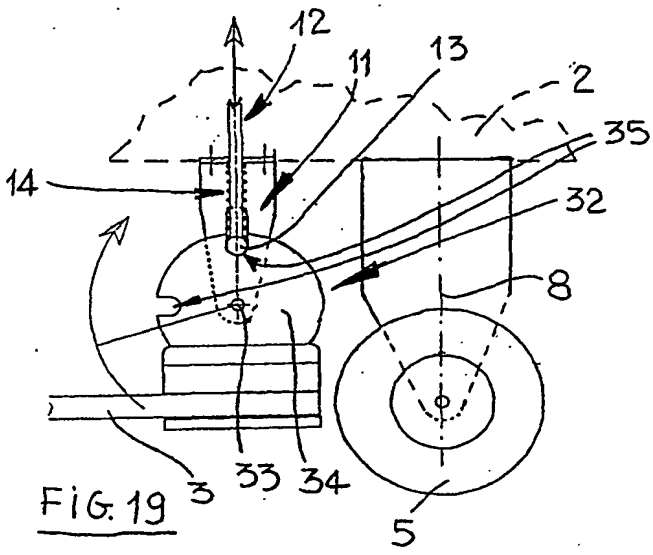


FIG. 19

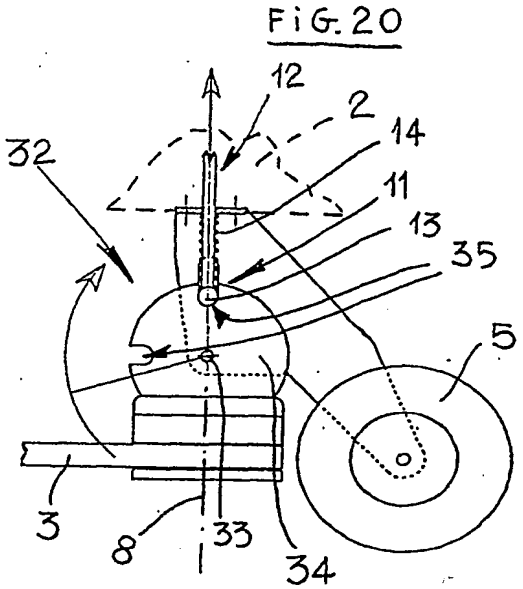


FIG. 20

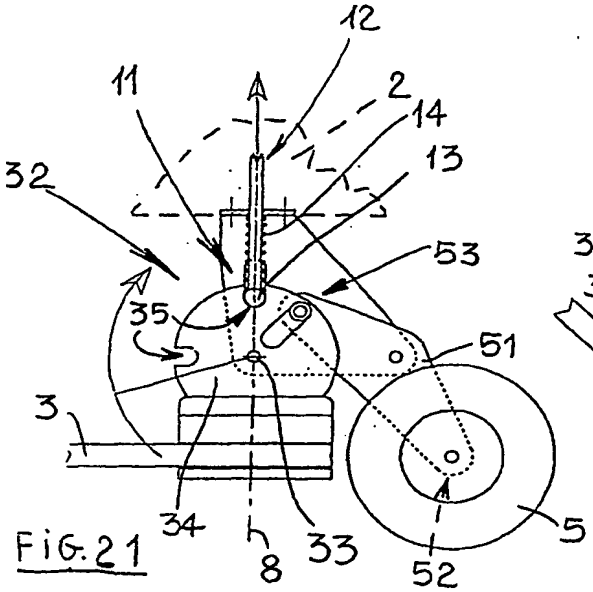


FIG. 21

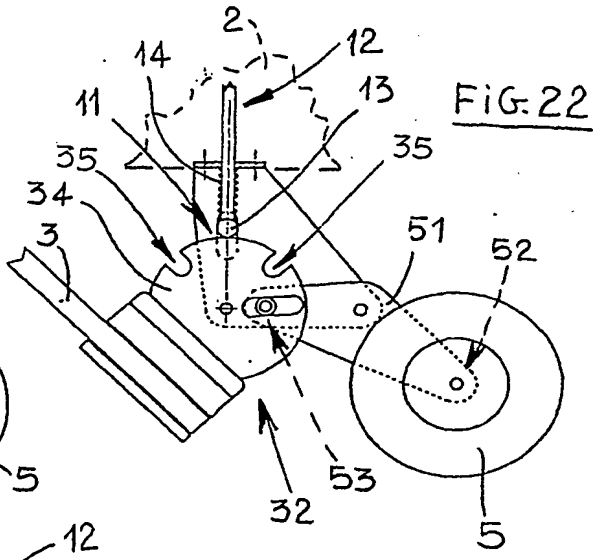


FIG. 22

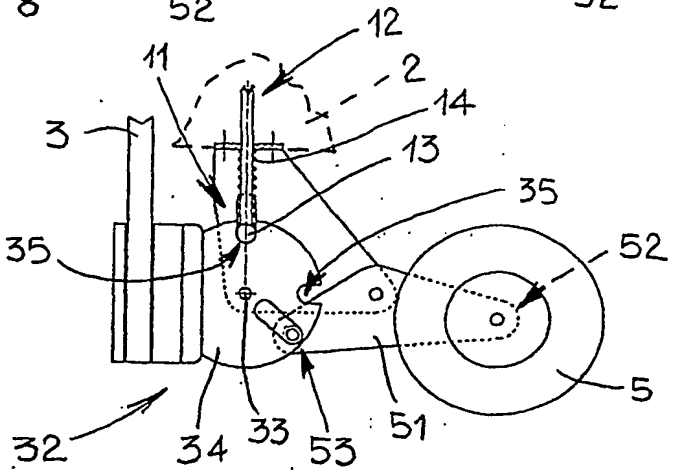


FIG. 23

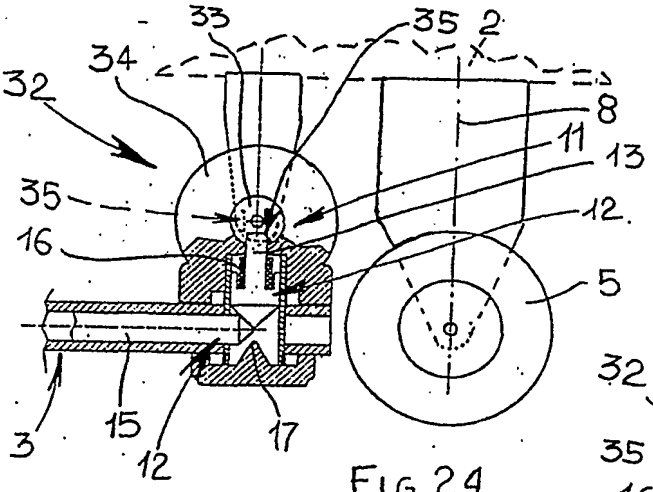


FIG.24

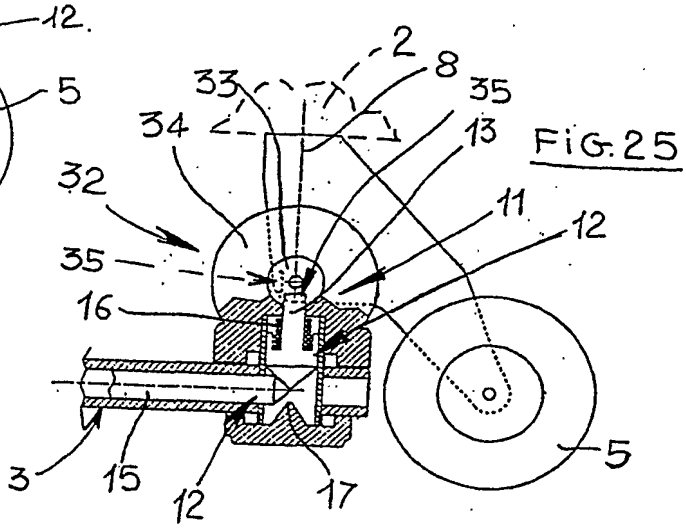


FIG.25

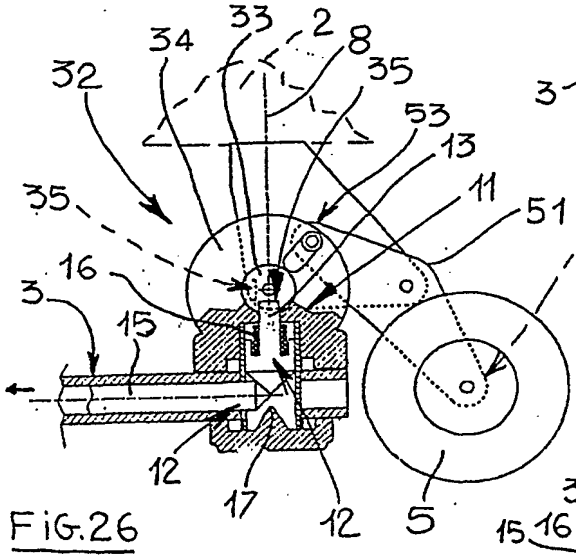


FIG.26

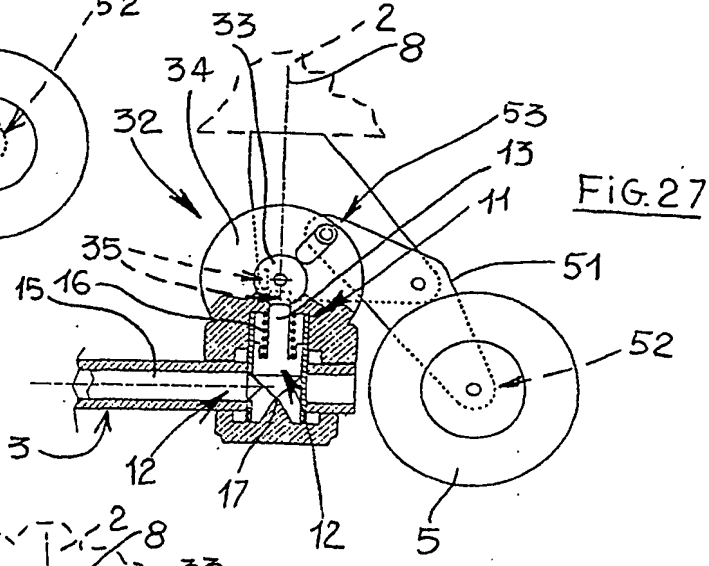


FIG.27

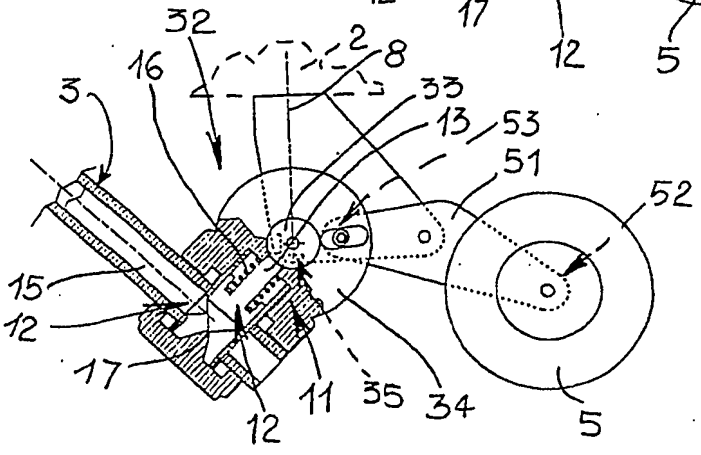


FIG.28

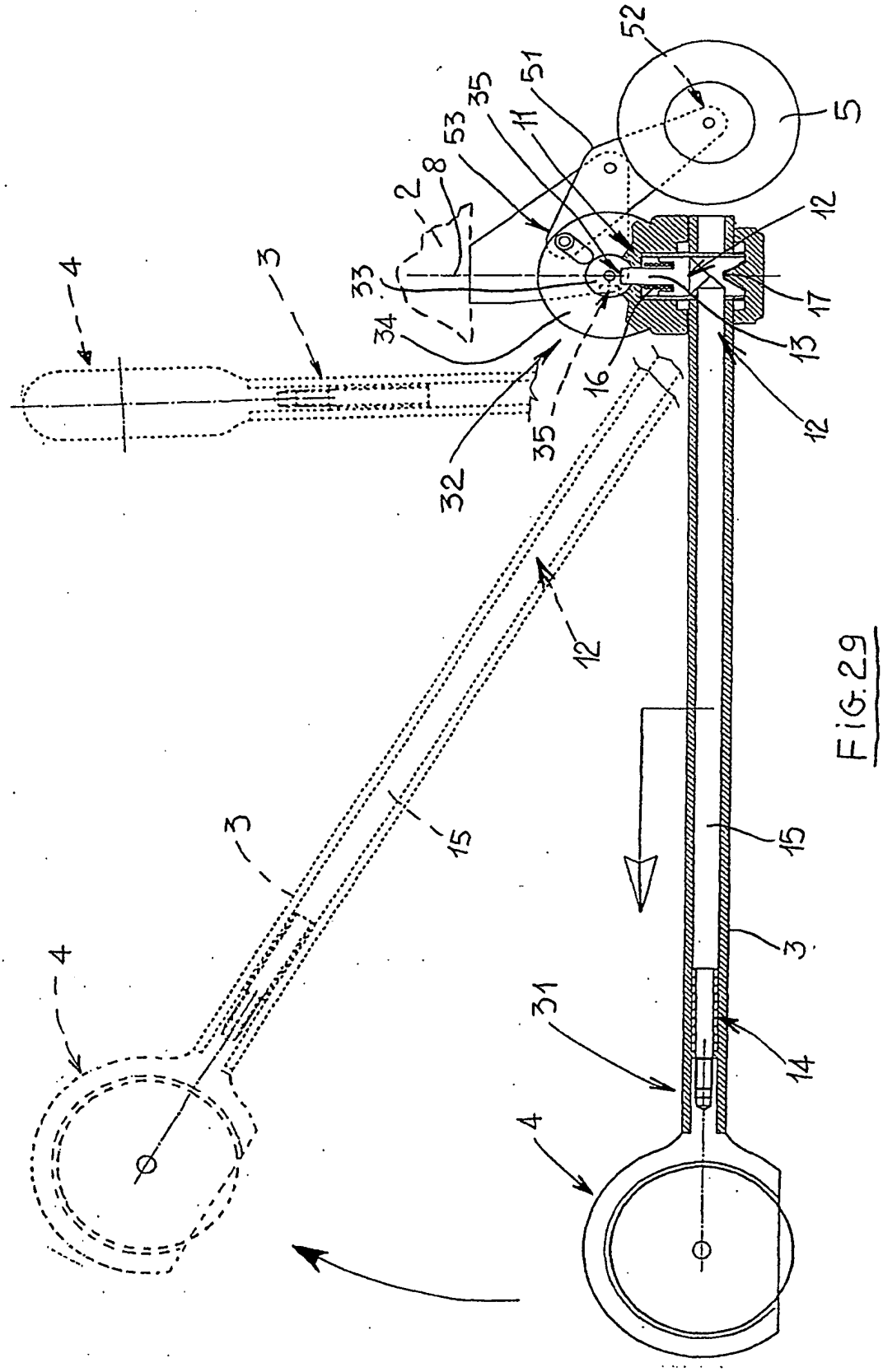


FIG. 29

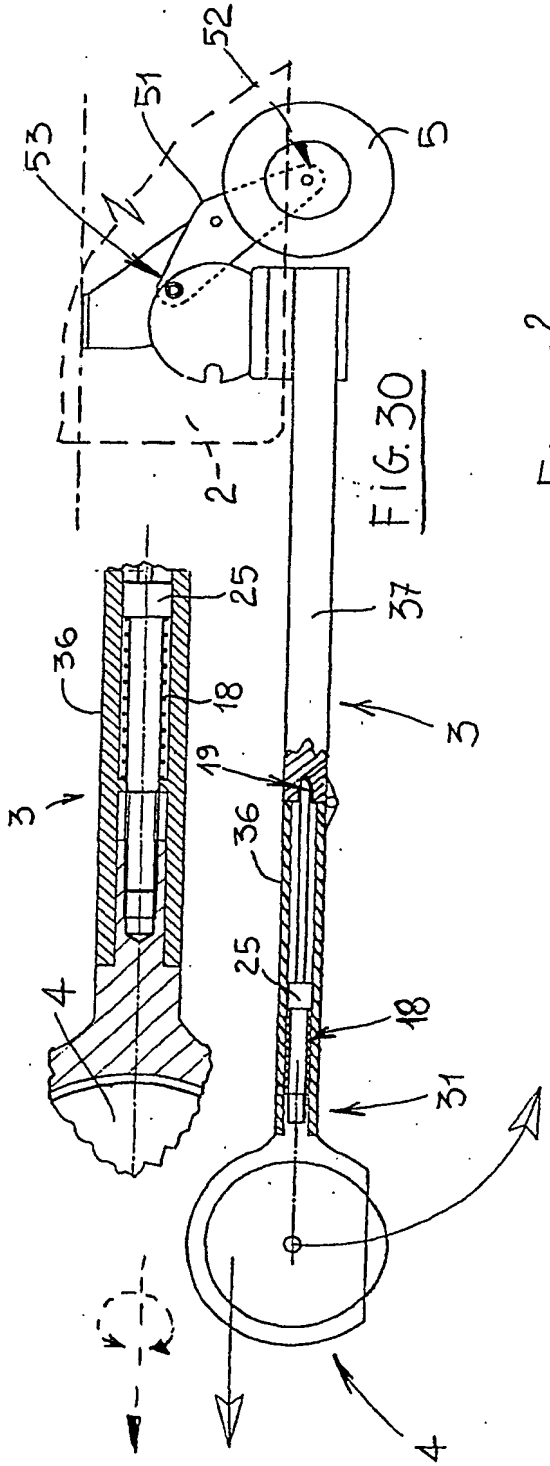


FIG. 30

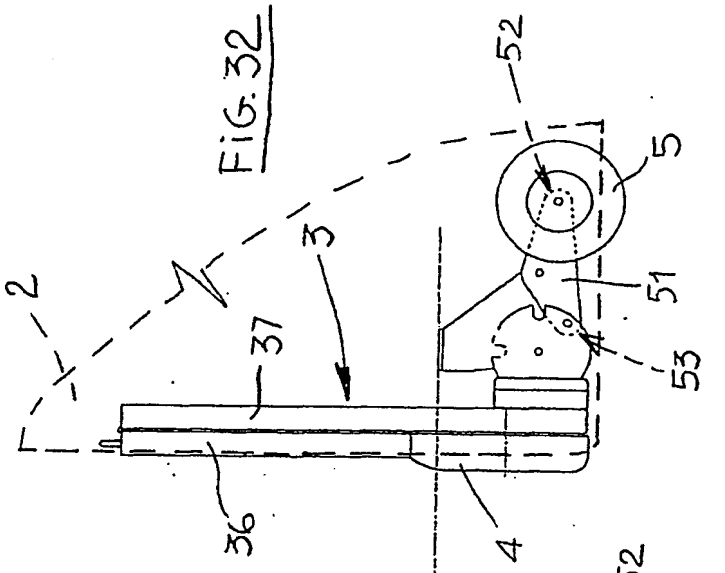


FIG. 32

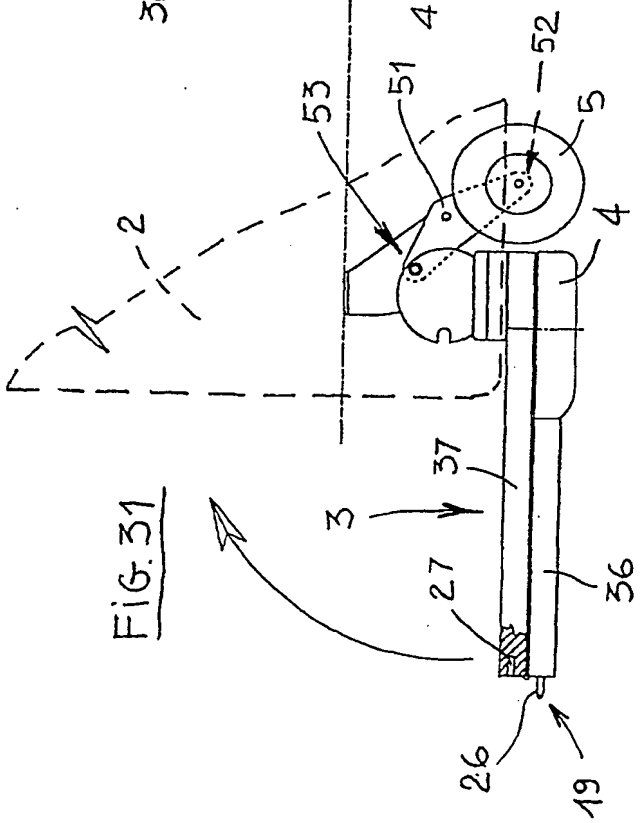


FIG. 31

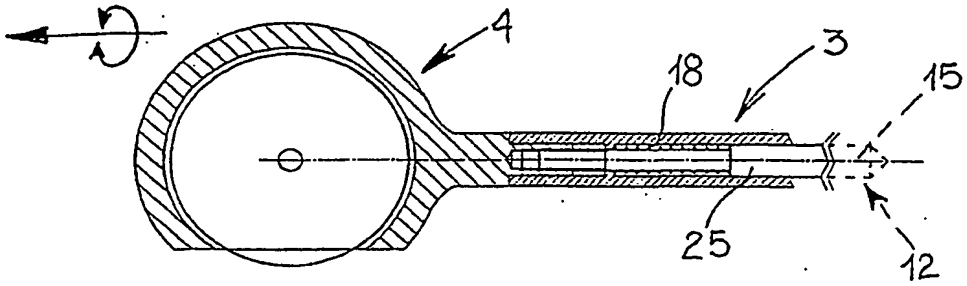


FIG. 37

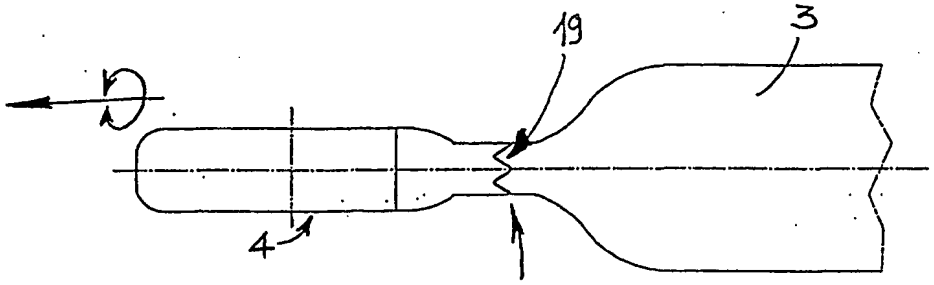


FIG. 33

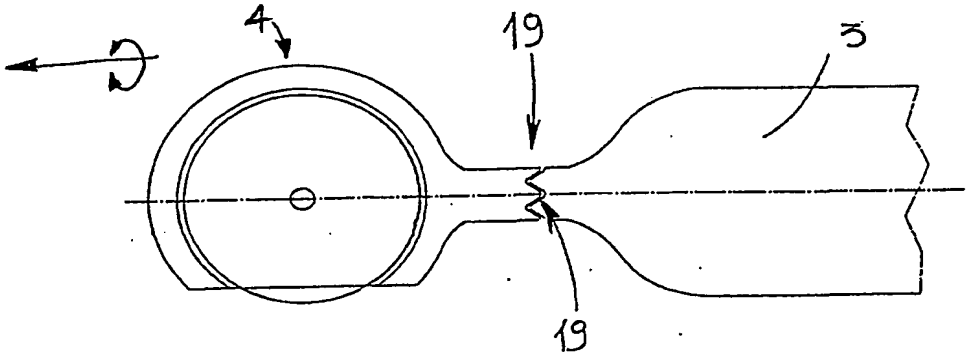


FIG. 34

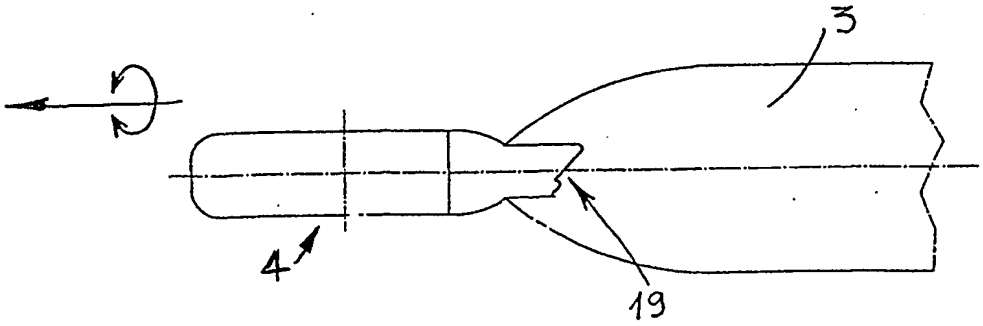


FIG. 35

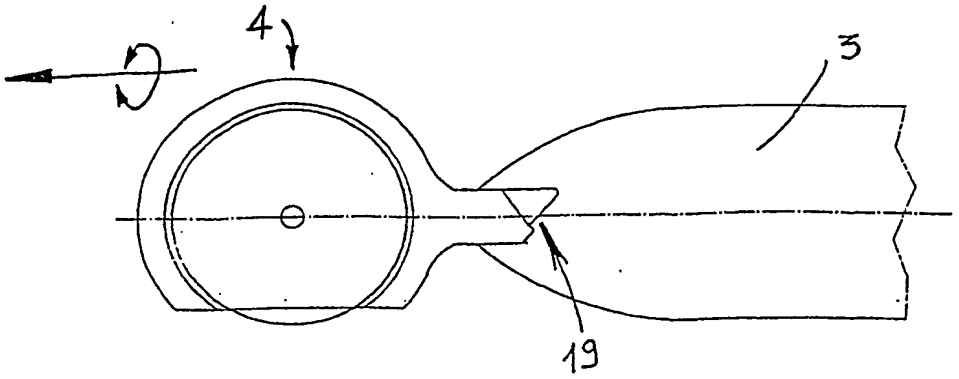


FIG. 36

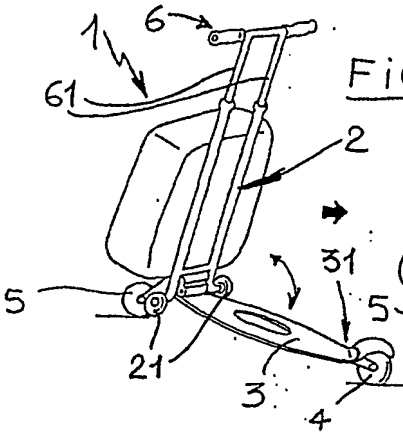
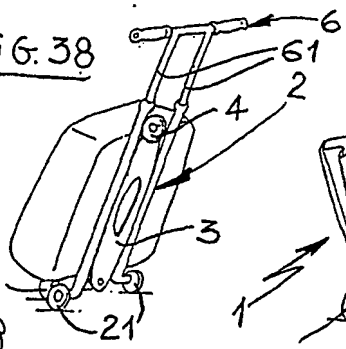


FIG. 38



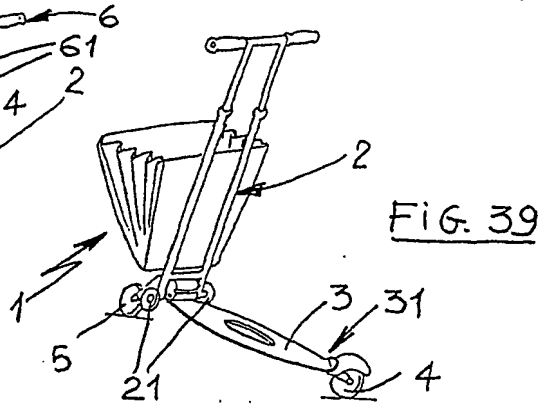


FIG. 39

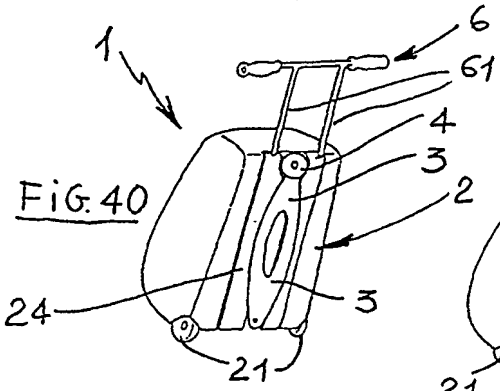


FIG. 40

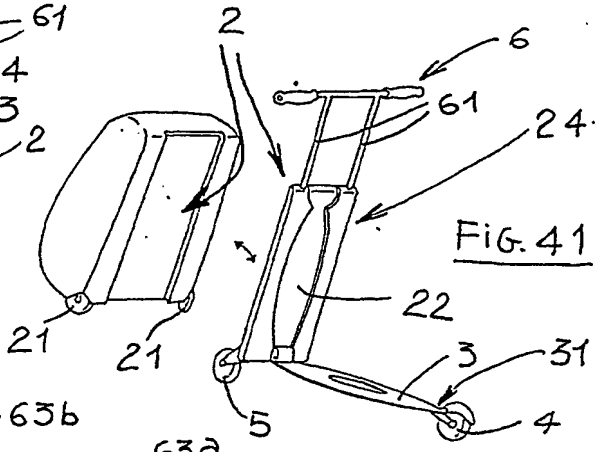


FIG. 41

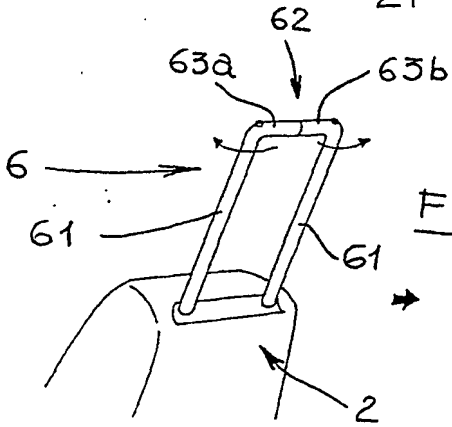
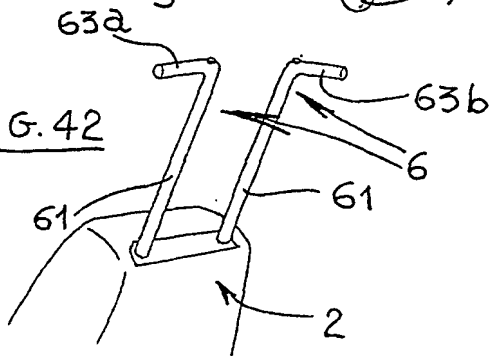


FIG. 42



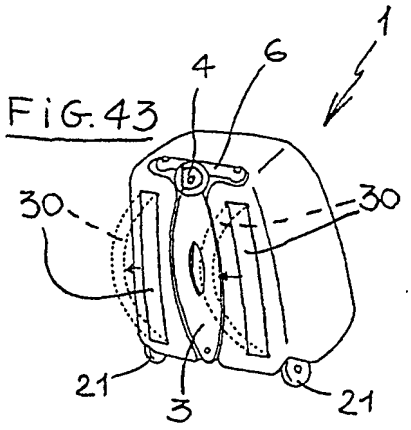


FIG. 43

FIG. 44

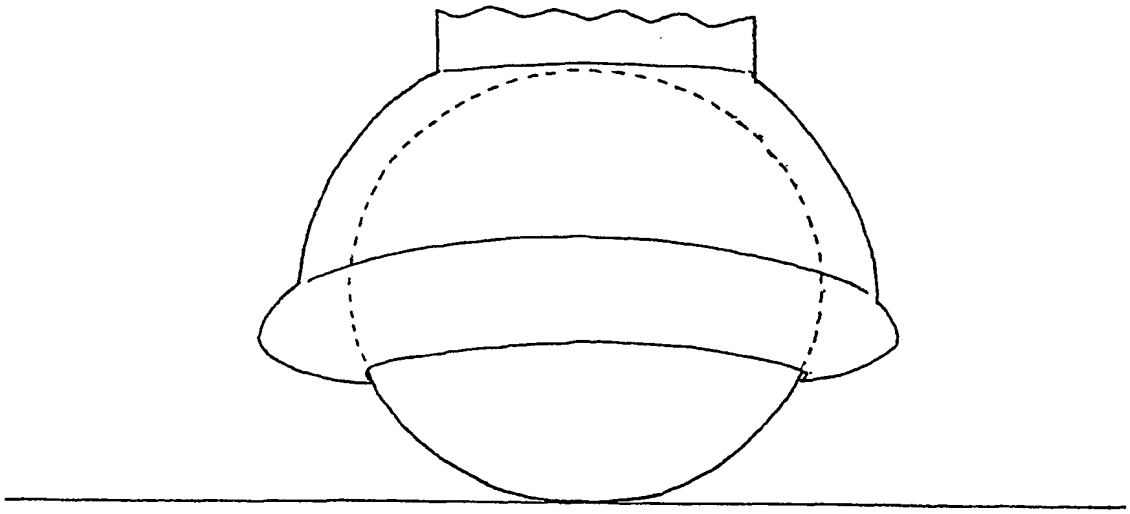


FIG. 45

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/IB 01/02292

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A45C5/14 B62K3/00 B62K5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A45C B62K B62D A63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 913 252 A (BARTLEY B DEAN ET AL) 3 April 1990 (1990-04-03) column 1, line 62 -column 2, line 50	1,2
X	US 3 314 494 A (WEITZNER DOROTHEA M) 18 April 1967 (1967-04-18) column 2, line 11 -column 3, line 59	1
A	DE 36 36 064 A (SCHAEFER HEINRICH) 28 April 1988 (1988-04-28) the whole document	1
P,X	WO 01 72164 A (ROEDER KLAUS) 4 October 2001 (2001-10-04) page 6, line 24 -page 8, line 2	1-4,25

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
12 February 2002	01/03/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Koob, M

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/IB 01/02292

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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P,X	DE 200 19 606 U (HEIPERTZ WALTHER) 6 September 2001 (2001-09-06) the whole document	1-4,27, 28
P,X	DE 200 18 919 U (LOSKE KLAUS) 15 February 2001 (2001-02-15) page 2, line 34 -page 4, line 34	1-4,25

INTERNATIONAL SEARCH REPORT

....ormation on patent family members

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